Consultancy report

On

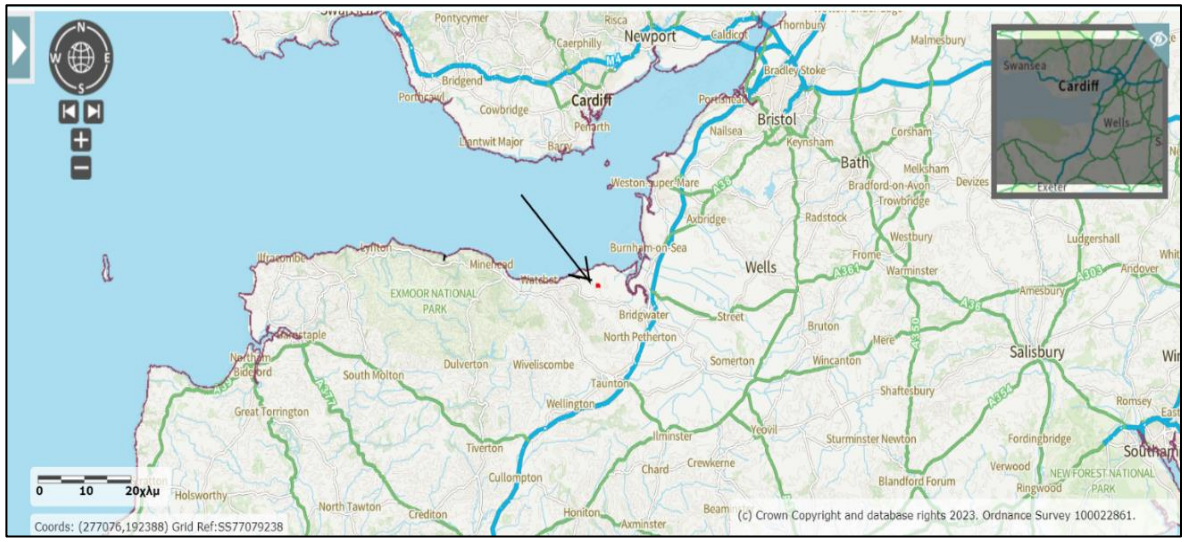
Solar farm development project in

Stogursey, Somerset

17/04/2023

Introduction

- Environmental consultants protect natural resources for future generations and help businesses and government decision-makers understand and reduce growth's negative impact (Wilson & Tattersfield, 2004). Ecology consultants need to undertake research and surveys to be able to provide suggestions on ecological matters related to future projects and policies (Wilson & Tattersfield, 2004). Consequently, they need to assess a proposed development site to see if the development will have any negative environmental impacts. Projects Include residential builds, new commercial sites, additions to existing developments and more.



- County of Somerset, Southwest of England

Figure 1. The site is located near Stogursey at ST19784233.

- The client is intending to develop a solar farm at the specific location. Solar energy offers reduction of carbon emissions, is renewable energy source and decrease the reliance on fossil fuels (coal, oil, natural gas). Additionally, there are some disadvantages such as weather dependence, higher cost and is a threat to the local environment (use of large area of land can adversely affect native vegetation and wildlife in many ways, including habitat loss or direct contact, which may cause severe injuries).

- **The key characteristics of an optimal site for solar farm development are:**

- Access to electric utility infrastructure
- Land that is flat and cleared of trees
- No wetland or floodplain impacts
- No impact on protected ecosystems and organisms
- No impact on cultural or archaeological resources

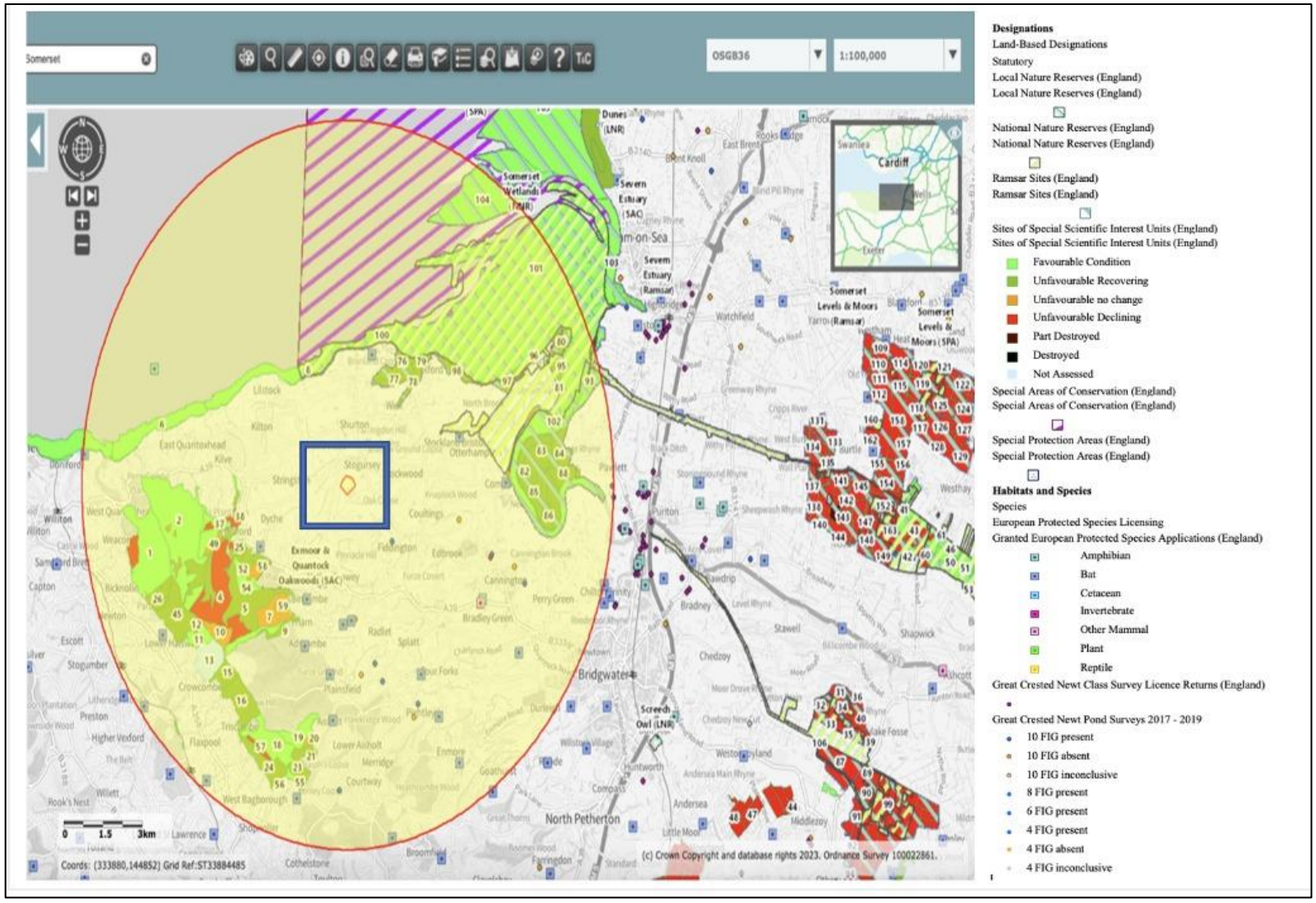


Figure 2. Site Context.

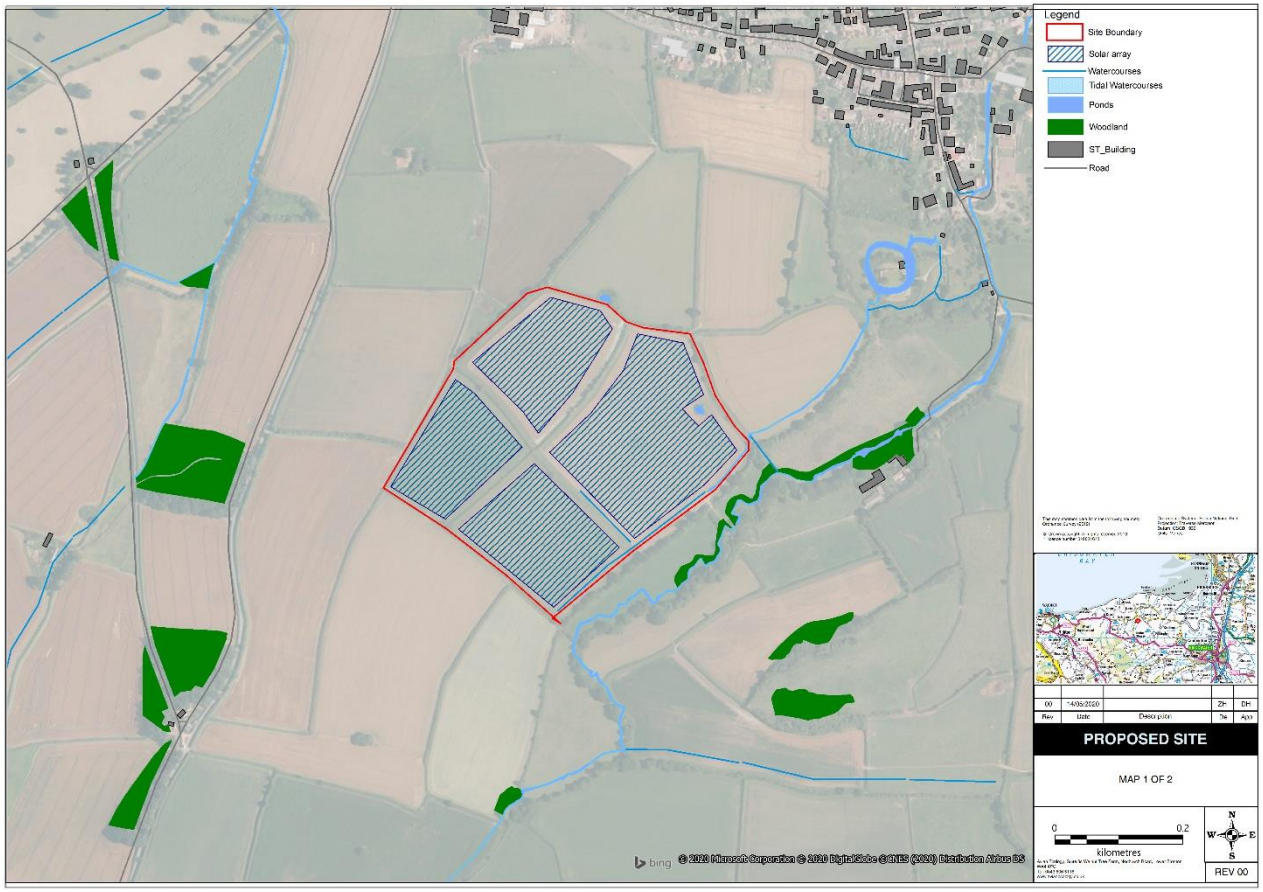


Figure 3. Site boundaries of the solar farm development.

- There are slightly acid loamy and clayey soils with impeded drainage in this area. Main habitat type predictions are “Deciduous Woodland”, “Arable and Horticultural”, “Improved Grassland” and “Acid,

Calcareous, Neutral Grassland". At 100 meters buffer are found three "Countryside Stewardship Agreement Management Areas" (Ref.521312, Ref.517885, Ref.644453) and two Higher Level Stewardship. Consequently, maintenance and enhancement of the landscape quality and character are ensured, along with the protection of the natural resources and the historic environment (Lobley & Potter, 1998).

- Solar projects require extensive studies to be completed to ensure that they will have no negative impact on existing ecosystems, protected and endangered species, and other resources (Hernandez et al., 2014). Consultancy undertake an ecological impact assessment called Preliminary Ecological Appraisals (PEA) or Phase 1 Habitat Surveys. Ecology consultants will create a project report, summarizing what habitat would be lost, the magnitude and the significance of this, along with their results and suggestions about the project development and its full ecological impact. Additionally, laws and policies, regarding protected species and local environment, will be checked and included.

Desk study

- The climate in Stogursey, Somerset is temperate with annual mean temperature at 10 °C. There is diversity of habitats, as mentioned, which leads to diversity of flora and fauna. Environmental attractions many nature reserves, parks and SSSIs can be found all around the village. However, many people have fewer opportunities to enjoy the rural landscape and may be experiencing poor conditions in their immediate environment. One of the seven domains of deprivation that exists in Somerset County is the "Living Environment index of deprivation", which includes: i) indoors-the proportion of people that do not have central heating and the homes that fail to meet the Decent Homes standard; ii) outdoors- the measure of air quality based on emissions rates for four pollutants and the road traffic accidents involving injury to pedestrians and cyclists. Pollution caused by road traffic and refusion of recycling are major problems at this area.

- The species survey was completed using government software called MAGIC (MAGIC, 2021). The area of the project was found and specified on the MAGIC map. Afterwards, corresponding buffers were

applied to each group of sites of our interest and the result lists were generated. Buffers of 2 km, 5 km and 10 km were used for Local National Nature Reserves, Sites of Special Scientific Interest (SSSI) and Special Protected Areas respectively. Finally, a generalized map (see Figure.2), with a legend, was produced for easier and overall assess of the project site.

- Additional species' repeated information was collected from the National Biodiversity Network (NBN) Atlas and other government sources.

- **Main legislations on site:**

- Wildlife and Countryside Act 1981 (WACA): primary legislation which protects animals, plants and habitats in the UK.
- Natural Environment and Rural Communities Act 2006 (NERCA): extends the biodiversity duty set out in the Countryside and Rights of Way (CROW) Act to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- European Protected Species Law: full protection under The Conservation of Habitats and Species Regulations 2017.
- Biodiversity Action Plan 2007 (BAP): includes national BAP and priority species list
- Birds of Conservation Concern (BoCC) UK list: includes the status of all regularly occurring birds in the UK, Channel Islands and Isle of Man.

Table 1. Table of species presented on development site, along with associated legislations and status information.

Scientific name	Common name	Site/ location	Grid	Start date	End date	Statutory	EU Protected	EU Priority	UK Conservation Status	WACA 1981	NERCA 2006	BAP 2007	LBAP 2009	County notable	Taxon
Triturus cristatus	Great Crested Newt	Somerset	ST19764232	19/11/2013	07/01/2015	European Protected Species	*			*	*	*		*	Amphibian
Rhinolophus hipposideros	Lesser horseshoe bat	Somerset	ST19764232	08/07/2013	12/01/2015	European Protected Species	*			*	*	*	*	*	Mammals
Lutra lutra	Common otter	Somerset	ST19764232	07/12/2016	31/10/2016	SAC	*			*				*	Mammals
Myotis daubentonii	Daubenton's bat	Somerset	ST19764232	12/01/2013	30/09/2016	European Protected Species	*			*			*	*	Mammals
Barbastella barbastellus	Barbastelle bat	Somerset	ST19764232	22/05/2015	21/05/2020	SAC	*			*	*	*	*	*	Mammals
Myotis bechsteinii	Bechstein's Bat	Somerset	ST19764232			SAC	*			*	*	*	*	*	Mammals
Petromyzon marinus	Sea lamprey	Severn Estuary	ST19764232			SAC				*	*	*		*	Fish- jawless
Lampetra fluviatilis	River lamprey	Severn Estuary	ST19764232			SAC				*	*	*		*	Fish- jawless
Alosa fallax	Twaite shad	Severn Estuary	ST19764232			SAC				*	*	*		*	Fish- bony

Phengaris arion	Large blue butterfly	Somerset	ST19764232			European Protected Species				*	*			*	Butterfly
Recurvirostra avosetta	Avocet	Somerset	ST19764232						Amber	*				*	Bird
Natrix natrix	Grass snake	Somerset	ST19764232							*	*	*		*	Reptile
Vipera berus	Adder	Somerset	ST19764232							*	*	*		*	Reptile
Bucephala clangula	Golden eye	Somerset	ST19764232						Red	*				*	Bird
Milvus milvus	Red kite	Somerset	ST19764232						Green	*				*	Birds of prey
Anthus trivialis	Tree pipit	Somerset	ST19764232						Red	*	*	*		*	Bird
Alauda arvensis	Skylark	Somerset	ST19764232						Red/ Concern 4	*	*	*		*	Bird
Cettia Ceti	Cetti's warbler	Somerset	ST19764232						Green/Concern 4	*				*	Bird
Crex crex	Corn crake	Somerset	ST19774232						Red/ 4	*	*	*		*	Bird
Emberiza cirlus	Cirl bunting	Somerset	ST19774232						Red/ Concern 4	*	*	*		*	Bird
Locustella naevia	Grasshopper warbler	Somerset	ST19764232						Red	*	*	*		*	Bird
Arvicola amphibius	Watervole	Somerset	ST19764232						Red	*	*			*	Mammals
Bufo bufo	Common toad	Somerset	ST19764232							*	*	*		*	Amphibian
Anguis fragilis	Slow worm	Somerset	ST19764232							*	*	*		*	Reptile
Zootoca vivipara	Common lizard	Somerset	ST19764232							*	*	*		*	Reptile
Coccothraustes coccothraustes	Hawfinch	Somerset	ST19764232						Red/ Concern 4	*	*	*		*	Bird
Emberiza citrinella	Yellowhammer	Somerset	ST19764232						Red/ Concern 4	*	*	*		*	Brid
Lullula arborea	Woodlark	Somerset	ST19764232						Green/ Concern 4	*	*	*		*	Bird
Erinaceus europaeus	Hedgehog	Somerset	ST19764232			VU/ IUCN				*	*	*		*	Mammals
Pipistrellus pipistrellus	Common pipistrelle	Somerset	ST19774232	16/11/2012	30/09/2015	SSSI	•			•	•	•	•	•	Mammals
Plecotus auritus	Brown long eared bat	Somerset	ST19774232	16/11/2012	30/09/2015	SSSI	•			•	•	•	•	•	Mammals
Myotis mystacinus	Whiskered bat	Somerset	ST19774232	19/09/2012	30/09/2014	SSSI	•			•			•	•	Mammals
Pipistrellus pygmaeous	Soprano pipistrelle	Somerset	ST19774232	19/09/2012	30/09/2014	SSSI	•				•	•	•	•	Mammals

Eptesicus serotinus	Serotine bat	Somerset	ST19774232	26/03/2012	28/02/2021	SSSI	•			•			•	•	**Mammals**
Myotis nattereri	Natterer bat	Somerset	ST19774232	26/03/2012	28/02/2021	SSSI	•			•		•	•	•	**Mammals**
Rhinolophus ferrumequinum	Greater horseshoe bat	Somerset	ST19774232	19/02/2021	18/02/2026	SSSI	•			•	•	•	•	•	**Mammals**

Table 2. Additional species data including BoCC legislations.

Scienfitic Name	Common Name	Taxon	WACA1981	NERCA 2006	BAP 2007	RSPB Red list	RSPB Amber list
Lissotriton vulgaris	**Smooth newt**	**Amphibian**	Yes	No	No	N/A	N/A
Lepus europaeus	Brown Hare	**Mammal**	No	Yes	Yes	N/A	N/A
Meles meles	**Badger**	**Mammal**	Yes	No	No	N/A	N/A
Micromys minutus	Harvest Mouse	**Mammal**	No	Yes	Yes	N/A	N/A
Anthus trivialis	Tree Pipit	**Bird**	No	Yes	Yes	Yes	No
Aythya marila	**Scaup**	**Bird**	Yes	Yes	Yes	Yes	No
Branta bernicla bernicla	Dark-bellied brent goose	**Bird**	No	Yes	Yes	No	Yes
Anas acuta	**Pintail**	**Bird**	Yes	No	No	No	Yes
Calcarius lapponicus	**Lapland bunting**	**Bird**	Yes	No	No	No	Yes
Calidris pugnax	**Ruff**	**Bird**	Yes	No	No	Yes	No
Calidris maritima	**Purple Sandpiper**	**Bird**	Yes	No	No	Yes	No
Cettia cetti	**Cetti's warbler**	**Bird**	Yes	No	No	No	No
Charadrius dubius	**Little-ringed plover**	**Bird**	Yes	No	No	No	No
Clangula hyemalis	**Long-tailed duck**	**Bird**	Yes	No	No	Yes	No
Cuculus canorus	Cuckoo	**Bird**	No	Yes	Yes	Yes	No

Curruca undata	**Dartford Warbler**	**Bird**	Yes	No	No	No	Yes
Cygnus cygnus	**Whooper Swan**	**Bird**	Yes	No	No	No	Yes
Emberiza citrinella	Yellowhammer	**Bird**	No	Yes	Yes	Yes	No
Emberiza schoeniclus	Reed Bunting	**Bird**	No	Yes	Yes	No	Yes
Falco columbarius	**Merlin**	**Bird**	Yes	No	No	Yes	No
Falco peregrinus	**Peregrinne**	**Bird**	Yes	No	No	No	No
Falco subbuteo	**Hobby**	**Bird**	Yes	No	No	No	No
Fringilla montifringilla	**Brambling**	**Bird**	Yes	No	No	No	No
Ichthyaetus melanocephalus	**Mediterranean gull**	**Bird**	Yes	No	No	No	Yes
Larus argentatus	Herring gull	**Bird**	No	Yes	Yes	Yes	No
Limosa limosa	**Black-tailed godwit**	**Bird**	Yes	Yes	Yes	Yes	No
Linaria cannabina	Linnet	**Bird**	No	Yes	Yes	Yes	No
Linaria flavirostris	Twite	**Bird**	No	Yes	Yes	Yes	No
Locustella naevia	Grasshopper warbler	**Bird**	No	Yes	Yes	Yes	No
Lullula arborea	**Woodlark**	**Bird**	Yes	No	No	No	No
Melanitta nigra	**Common Scoter**	**Bird**	Yes	Yes	Yes	Yes	No
Motacilla flava flavissima	Yellow wagtail	**Bird**	No	Yes	Yes	Yes	No
Numenius arquata	**Curlew**	**Bird**	Yes	Yes	Yes	Yes	No
Muscardinus avellanarius	Hazel dormouse	**Mammal**	Yes	Yes	Yes	N/A	N/A
Numenius phaeopus	**Whimbrel**	**Bird**	Yes	No	No	Yes	No
Passer domesticus	House Sparrow	**Bird**	No	Yes	Yes	Yes	No
Passer montanus	Tree Sparrow	**Bird**	No	Yes	Yes	Yes	No
Phoenicurus ochruros	**Black redstart**	**Bird**	Yes	No	No	No	Yes
Phylloscopus sibilatrix	Wood warbler	**Bird**	No	Yes	Yes	Yes	No

Plectrophenax nivalis	**Snow bunting**	**Bird**	Yes	No	No	No	Yes
Poecile montanus	Willow tit	**Bird**	No	Yes	Yes	Yes	No
Poecile palustris	Marsh tit	**Bird**	No	Yes	Yes	Yes	No
Recurvirostra avosetta	**Avocet**	**Bird**	Yes	No	No	No	Yes
Streptopelia turtur	Turtle dove	**Bird**	No	Yes	Yes	Yes	No
Sturnus vulgaris	Starling	**Bird**	No	Yes	Yes	Yes	No
Tringa glareola	**Wood sandpiper**	**Bird**	Yes	No	No	No	Yes
Tringa nebularia	**Greenshank**	**Bird**	Yes	No	No	No	Yes
Tringa ochropus	**Green sandpiper**	**Bird**	Yes	No	No	No	Yes
Turdus iliacus	**Redwing**	**Bird**	Yes	No	No	No	Yes
Turdus pilaris	**Fieldfare**	**Bird**	Yes	No	No	Yes	No
Turdus philomelos	Song thrush	**Bird**	No	Yes	Yes	No	Yes
Tyto alba	**Barn Owl**	**Bird**	Yes	No	No	No	No
Vanellus vanellus	Lapwing	**Bird**	No	Yes	Yes	Yes	No

Survey methods

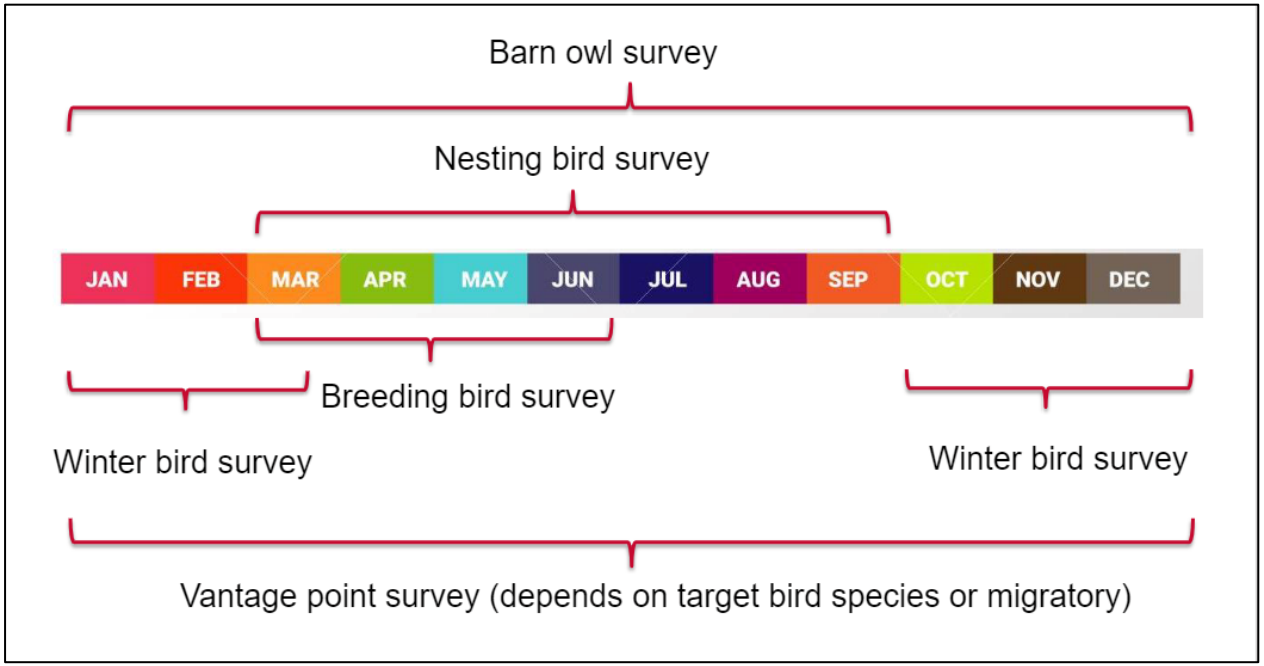


Figure 4. Survey timing (Lecture material)

- **Suggested ecological surveys due to existing protected species on the site:**

1. **Mammal surveys**

- Suggested survey methods are “Field signs” method and “Camera trapping/monitoring”, as they are both proven to be effective for small, medium-sized, and large mammals. These methods have no

impacts on the animals throughout the surveying period and there are no ethical issues of their use. In consideration of the active season of each species, surveys will take place in winter between October and February (estimated 3-4 weeks of surveys) and then in spring-summer between March-August (estimated 3-4 weeks of surveys).

- ✓ The observed field signs will be compared in accordance with their shape, size, habitat, number of digits (footprints) and type of food (feeding signs). This type of surveys will be undertaken within the project area, including the surrounding area of 3 km distance. This way, potential burrows and tracks outside the development area will be included. Field signs will be counted and recorded in each 100m length of the transect for optimal data collection.

- ✓ Trapping cameras will be run for 3-5 weeks across 40-60 sites per array. Comparisons of detection rates will be model based and will include local covariates (individual ID/ abundance) to help the estimation of small-scale variation. Camera trapping observation apps might be used along with the field signs surveys for precise data collection.

2. Herpetofaunal surveys

- Suggested survey methods are “Egg searching”, “Dip netting”, “Funnel traps”, “Terrestrial drift fences” (migrating individuals) and “Hand searching”. The use of detection dogs it is not suggested due to ethical issues. Amphibian and reptile surveys will be carried out separately. Reptile surveys will be undertaken in April, May and September as emerging animals will be close to their winter sites. Species sites will be checked seven times within this survey period. Amphibian surveys will take place between mid of March and mid of June. However, Habitat Suitability Index (HSI) investigation will precede to examine the ponds potential to support newts. In the period between mid of April and mid of May the first four visits will be done and if newts are being identified, then additional two visits will be required.

3. Bat surveys

- Suggested surveys are “Preliminary Bat Roost Assessment” (PRA), which will be used to evaluate trees and surrounding habitats to determine their suitability for roosting bats and potential breeding site (Phase I) and “Acoustic sampling” (Phase II), which will involve a walked route around the site, stopping at specific points (listening stations) to record bat activity. Emergence surveys (Phase I) will take place between May and August and will be spaced by two weeks. Additionally, two surveys will be completed by the end of August. Activity surveys (Phase II) will be undertaken between April and October and planned average visits at site will be 6-7. Heterodyne detector will be used to collect bats data at 12 stopping points and noctule and serotine passes will be counted between these points. Additionally, pipistrelle passes will be counted for two minutes stops at each point. Acoustic data will be collected using bat detectors (suggested full spectrum/direct sampling). Finally, waterway survey will be undertaken for Daubenton’s bat species on site, during summer months.

4. Bird surveys

- Suggested surveys are:

    - ✓ “Nesting bird survey” which will be used to ensure that there are no active bird nests present on site prior to project development. This survey will include regular visits on development site and thorough inspection of all buildings and trees on the site looking for specific evidence that points to use of the site by nesting birds. Survey timing: between March and September.

    - ✓ “Breeding bird survey” which will be used to identify species breeding on site as well as their abundance and distribution during breeding season. This survey will include a reconnaissance visit and two early-morning spring visits to each survey square (1km² patch). Survey timing: between March and June.

    - ✓ “Wintering bird survey” which will be used to determine the species composition and the numbers present at potentially important wintering sites. This survey will include four site visits, one per month within the survey period, along with additional knowledge about

potential requirements associated with wildfowl, waders and farmland birds found on site. Survey timing: between January and March.

- ✓ "Vantage Point Survey" (VP) which will be used for the assessment of the site in relation to bird flight behaviour. This survey will include the establishment of VP locations, their confirmation through GIS and field trials and finally VP watches will be carried out monthly at each location for approximate time of six hours for a minimum of three months.

- ✓ "Barn owl survey" which will be used to ensure compliance with legislation and planning regulations related to barn owl species, which might be nesting in nearby buildings or trees. Survey timing: all year round.

5. Environmental DNA survey (eDNA metabarcoding) which will be used for optimal identification of all species (mammals, birds, herpetofauna, fish, insects) within the development area. This survey will include water, soil and air sampling, using specific kits of filters for each method.

Survey timing: between April and June.

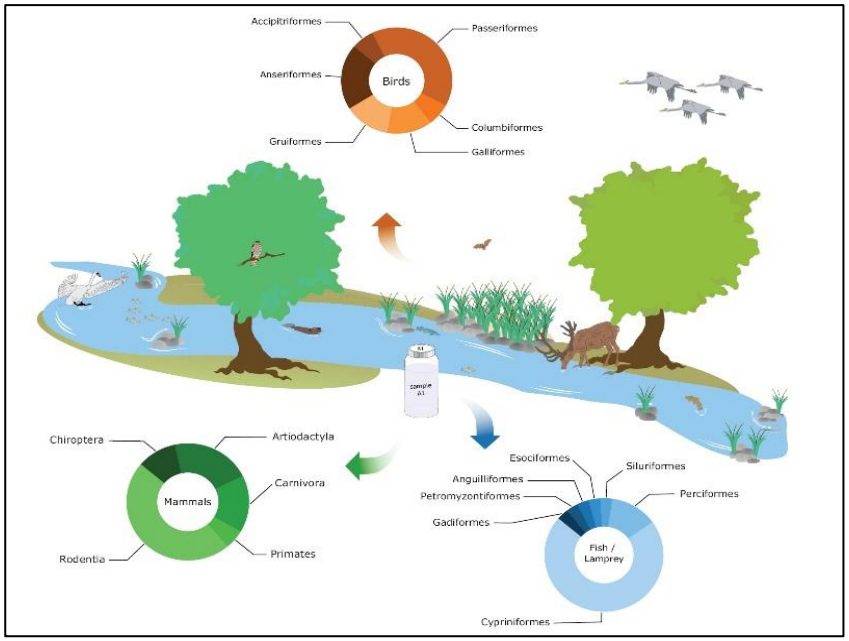


Figure.5 Environmental DNA survey

source: Journal of Biological Education

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